(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 521 695 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
10.04.1996 Bulletin 1996/15

(51) Int. Cl.[6]: **B61D 39/00**, B61D 19/00

(21) Application number: **92306025.5**

(22) Date of filing: **30.06.1992**

(54) **Wagon with removable cover**

Güterwagen mit verschiebbarer Abdeckung

Wagon à marchandise avec couverture à capote amovible

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU MC NL PT SE

(30) Priority: **03.07.1991 FI 913228**

(43) Date of publication of application:
07.01.1993 Bulletin 1993/01

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EP 0 521 695 B1

Printed by Rank Xerox (UK) Business Services
2.9.15/3.4

Description

This invention relates to the design of a covered railway wagon, in which at least one cover section consists of walls that are rotatable with regard to each other and can be lifted and separated by their lower edges into a switch position in order to open up the wagon partly; the wagon contains first rail sections, which, bearing onto the lower surface of support rolls mounted on bearings in the cover section, lift the support rolls from a position in which the walls are closed onto fixed run rails of the wagon frame, whereby the second rail sections are removed to the side and the first rail sections are aligned with these fixed run rails in their openings, thus forming a uniform running surface for the support rolls, along which the support rolls may roll and thus enable to transfer the cover section in the longitudinal direction of the wagon with regard to the rest of the cover section; as well as second rail sections, which, as the support rolls pass into a position corresponding to the closed position and away from the fixed rails, are aligned with the fixed run rails in their openings and thus form a uniform running surface for the support rolls. Switching the walls from the transfer position to the closed position involves essentially inversed actions; as the first rail sections are fixed to a pivoted axle, which is placed in such a position with regard to the run rails, that a predetermined rotation of the axle males the first rail sections move to the fixed run rails and back again; the axis of rotation of the pivoted axle being below the fixed run rail in the vertical plane determined by the run rail or at the most spaced from this towards the axis of the wagon, this distance being essentially smaller than the fixing distance of the first rail section from the axis of rotation; the switch of the cover sections from the closed position to the transfer position and back again being produced by a corresponding change of the position of the rail sections by this switch mechanism.

More specifically, the invention relates to a goods wagon, comprising typically two identical cover sections successively in the longitudinal direction of the wagon. In this case, a normal requirement is that each cover section be removable in the longitudinal direction of the wagon to the second cover section and inversely. The most common way of arranging this is to provide a longitudinal hinge in the roof of the cover section, so that the roofs and walls of one cover section can be swung outwards and upwards. As the cover section is slightly raised at the same time, its inner dimensions will reach on top of the stationary second cover section. After the above operation, one cover section is normally pushed on top of the second cover section by means of run rail-roll means disposed in various ways on the sides of the wagon.

It is not very easy to achieve a satisfactory run rail-roll means. It is conceivable that construction elements of the same kind as in the slide doors of vehicles are used as a run rail-roll means. However, this is not possible because slide doors need to move only in one direction upwards, allowing a very simple and solid rail arrangement, whereas the cover section of a railway wagon should move sideways as well as upwards at its lower edge, the distance of motion being markedly longer than in slide doors. The known design of slide doors, such as e.g. the one of the GB patent specification 2 104 021, is not usable as such, since, when implemented in the cover section of a railway wagon, it results in a weak construction, both because of the excessive protrusion of the run rail supports and the great unsupported length of the construction element forming the rails.

The US patent specification 4 341 163 discloses a construction that is inverse to general practice, in other words with rails for moving the cover section as an integral part of the cover section and rolls placed in the wagon frame via gear racks, the cover section moving when these are actuated. This solution apparently works as such, but it requires the use of a profile especially made for this purpose, involving high costs. Another production technique would result in an even more expensive construction. The combined gear-pinion rack is also relatively complicated and expensive.

However, it is doubful whether these solutions could be implemented to move the entire cover section, given that two rail branches, even in mutually inversed positions, should form extensions of each other, for the rolls to roll from the moved cover section onto unturned rail sections at the unmoved cover section. This is difficult to achieve in a reliable manner.

The FR patent specification 1 451 558 describes a construction corresponding somewhat to the ones above, in which a support rail in the zone of the removable cover section is turned to the support rail in the stationary cover section, allowing a rail of the length of the total wagon for the pushing of the cover section. This solution also has the drawback of a very complicated gear construction and also of rails projecting from the cover section, which broaden the entire design and reduce the useful space.

The DE patent specification 3 312 001 presents a design, in which the rolls are solidly mounted onto bearings in the cover section and the wagon frame has solid run rails extending over the total length of the wagon. By appropriate dimensioning of these rails, they can be connected to the bottom frame of the wagon, whereby they do not increase the width or reduce the useful space of the wagon significantly. When the cover section is to be raised into the switch position, the rolls, which in this closed position are inside and below the rails, have to be lifted onto the rails. Since the rolls have to be grooved rolls, i.e. provided with flanges, the fitting on the rails requires an opening in the rail matching the flange of the groove. Then again, such openings are not allowed in rails, since the cover section must be easily pushed by hand, and when the wheel hits such an opening it cannot be removed by hand any more. For this purpose an auxiliary rail is provided in the area of the roll of the cover section, which moves along with the cover section

against a second roll in the wagon frame, this preventing the roll in the cover section from dropping into the recess. According to the specification, this second roll is also used for lifting the cover section into the switch position, whereby the second roll swings the cover section upwards and outwards from the auxiliary rail at the same time as the flange of the roll in the cover section passes the slot in the run rail. This design involves the particular drawback that the auxiliary rail, which can be only slightly longer than the slotted zone in the run rail, must be very carefully positioned in the rolls in the frame. This is usually not the case in reality, but even slight construction distortions, e.g. under temperature variations, result in the auxiliary rail not being correctly positioned. Consequently, the cover section is not removable at all, but a considerable force has to be applied to turn the elements into their right positions.

According to the FI Patent Application 862324, the problem discussed above is solved by turning the cover section into the switch position from grooved rolls mounted onto bearings in the cover section by means of auxiliary rails, the auxiliary rail settling into the opening of the rail stationary in the wagon frame. This opening is needed for bringing the roll into its position, as in the specification discussed above. According to the specification, the rolls also comprise an external cylindrical additional bearing surface, which is intended to roll by the cover section in its closed position in the area of the matching cavities on the auxiliary rails passing by these. This solution is otherwise effective, but here also a small recess has to be made in the auxiliary rail to match the cavity of the run rail. This is due to the fact that the cylindrical additional bearing portion must be moved at least horizontally to the rail or possibly upwards obliquely to the rail, whereby the upper surface of the rail cannot be exactly aligned with the roll surface. Hence, the solution of this specification involves problems in moving the cover section, as the cylindrical additional bearing surface sinks into the recess of the auxiliary rail, and the cover section is very difficult to get into motion again by hand.

The problems described above have been solved by the design in the FI patent specification 81310 or in the German patent specification DE-A-4006657. The patent specification describes as main advantage of the switch mechanism of the type described at the beginning of the application that the cover section can always be safely opened and moved in the longitudinal direction of the wagon by hand force without the occurence of any discontinuity due to the structure. It has now been observed in practical implementation that the cover switch mechanism according to the above patent does not always work satisfactorily, mainly because of human errors. Problems occur in two respects. Firstly, the service personnel does not always turn the switch mechanism into its extreme position by carefully turning the hand wheel, but leave it in its intermediate position after the switch. In this case, the other rail sections do not coincide exactly with the opening of the solid run rail, resulting in the cover being jammed in the second rail section when it is being moved. The second problem is caused by the truck that is loading the wagon, which incidentally hits the wagon sides. The run rail is damaged, which is not especially harmful as such, but damages affecting the operation of the mechanism will arise also at the transfer points of the run rails and in the first and second rail sections.

The purpose of the invention is thus to achieve a switch mechanism for the cover section, in which rolls mounted onto bearings in the cover section can roll at any point of the wagon length along a continuous straight run rail and in which the point of contact between the rolls and the rail remains at least substantially in the same planar zone perpendicular to the axis of the roll, and thus the force required by the transfer of the cover sections is kept low. The purpose of the invention is also such a design, which always provides a sufficiently exact planar zone for the rolls, even if the switch mechanism would be operated carelessly or wrong, and in which the rail sections are kept sufficiently undamaged during the loading operation. A further purpose of the invention is a construction, in which no point of the moving cover section, e.g. the support roll, has to move in the width direction of the wagon with regard to the other surface, i.e. in a direction angular to any of its butting faces, and thus the opening forces of the cover sections are also kept low.

The design according to the invention achieves a crucial improvement of the inconvenients described above and fulfills the objects defined above. In order to achieve this, the construction according to the invention is characterized by the features presented in the characterizing part of claim 1.

One could consider the main advantage of the invention that the cover sections can always be safely opened and moved in the longitudinal direction of the wagon by hand force without the occurence of any discontinuity due to the construction. The invention also has the advantage of a simple construction, and thus of a safe operation and also of low production costs.

The invention is explained in detail below with reference to the enclosed drawings.

Figure 1 shows a preferred embodiment of a construction according to the invention viewed in the longitudinal direction C of a goods wagon with the cover section lifted into the switch position.

Figure 2 shows the solution of figure 1 viewed in the transverse direction B of the goods wagon.

Figure 3 shows the construction of figures 1 viewed in the longitudinal direction C of a goods wagon, with the cover section lowered into the closing position.

Figure 4 shows the same construction in the closing position of figure 3 viewed in the transverse direction B of a goods wagon.

Figure 5 shows a second preferred embodiment of the construction according to the invention in the same projection as figure 3.

Figure 6 shows the embodiment of figure 5 viewed in the transverse direction B of a goods wagon.

Figure 7 is a general view of a wagon with a removable cover having the design according to the invention.

In figure 1 the cover section is generally marked with a full line and reference 1 in the switch position. Figure 3 shows the components of figure 1 with full lines in positions corresponding to the closed position of the cover section 1 and the positions of the components with dotted lines when the cover section 1 is in the switch position. The construction firstly comprises longitudinal stationary run rails 3 connected to the wagon frame 2 and passing on either side of it. Rolls 4 mounted on bearings in the cover section 1 run along these rails 3, and there are typically four or some other even number of these rolls, at least one in essentially each corner. When the cover section is in the switch position, as indicated with dotted lines in figure 3 and figure 1, the rolls 4 may roll on the rails 3 along the sides of the wagon, allowing the cover section to be pushed in the longitudinal direction of the wagon. The run rails 3 are placed in the wagon beneath the loading platform 20 in the wagon frame at such distances from each other that the rail and its support construction are within the outer surface of the closed cover sections, i.e. line 5 in figure 1. Thus, the rail construction does not increase the outer dimensions of the wagon.

When the cover section 1 is in its closed position, as indicated with a full line in figure 3 and figure 5 for the two cover sections 1, the lower edges of the cover section with their rolls 4 are situated between the run rails 3, in other words, when seen from outside the wagon, within the rails and below the rails. Thus, the cover section is tightly closed against the loading platform and the ends of the wagon and against each other.

When one wishes to lift the cover section from the closed position to the switch position, this is done by means of the switch mechanism 6. Such a switch mechanism is typically provided at each roll of the cover section in its closing position. The switch mechanism 6 consists of a pivoted axle 7 in the direction of the rails 3, which is mounted on bearings to rotate with regard to the wagon frame 2. On the axle 7, a rail section 13 parallel with the axis and thus with the run rail 3 is fixed at a distance R from the axis 8 of the axle 7. The length P of this rail section is exactly that much shorter than the length L of the opening 9 in the rail section 3 that the rail section 13 barely fits into the said opening 9. When the cover section 1 is in its closed position, the rail section 13 is beneath the rolls 4 inside and under the run rails 3. In this step, the rolls 4 and the cover section 1 do not actually bear on the rail sections 13, but the cover section bears on the wagon frame in order to provide a tight sealing, as described above.

When one wishes to move the cover section from the closed position to the moving position, the pivoted axle 7 is rotated, and then the rail section 13 bears on the lower side of each roll 4 and during the continued rotation lifts the cover sections via the rolls to rise and spread out in the switch position. The rising and spreading of the cover section is an ordinary motion as such. The distance R between the axis 8 and the rail section 13 and the position of the axis 8 of the axle are selected such that the distance of motion and the direction are great enough to produce the transfer of the cover section 1 outwards and upwards at the same time, from the closing position into the switch position, and to bring the rail section 13 as an extension of the run rail 3 in the slot 9 as the roll 4 is in a position corresponding to the closed position. The distance between the run rail 3 and the axis 8 is of course the presently mentioned distance R and the pivoted axle 7 and its axis 8 are advantageously vertically almost beneath the run rail 3, in the figures over a measure S towards the axis of the wagon from the vertical plane determined by the rail 3. The measure S is essentially smaller than the distance R. In principle, the measure S may be zero, whereby the axis 8 is exactly beneath the run rail 3 in the vertical plane, provided that the pivoted axle 7 and the related elements do not extend beyond the line 5. Hence each run rail 3 and rail section 13 form a continuous rail, along which the rolls 4 can roll freely by the cover section brought into its switch position.

When the cover section is in its closed position and the rolls 4 are inside the run rails 3 and the rail section 13 is beneath the rolls 4, a rail section 23 is situtated in each slot 9 and is aligned with the corresponding run rail 3 so that a continuous rail is formed, along which the rolls 4 of the second cover section can roll by the first cover section which is in its closed position.

The rail sections 13 are connected to the pivoted axle 7 by an appropriately shaped bar or plate or a corresponding support member 10. According to the invention, second rail sections 23 are disposed in the at least essentially vertical plane V, which is aligned with the stationary run rails 3, to move up and down. The upper position Y of the second rail section 23 then corresponds to the closed position of the walls and the lower position A corresponds to the switch position of the walls 1. These second rail sections are lifted and lowered into their upper and lower position by a mechanism, which is generally marked by reference 18 and which is preferably connected to co-operate with the said switch mechanism 6 of the cover section. The said vertical plane V is not necessarily exactly vertical but may be inclined in a small angle with regard to this in a not-represented manner, however a vertical position is advantageous. In this connection, the concept vertical denotes an at least essentially vertical direction. In principle, the mechanism 18 lifting and lowering the second rail sections does not necessarily have to be connected to the switch mechanism 6 of the cover section, but these rail sections could be operated by different actuators, which, however would involve a great risk of operating errors. The upper edge 19 of the second rail sections 19 have an upper face shaped for instance in the same way as the solid run rails 3 and its upper position Y has been dimensioned at a height such that the upper edge 19 is aligned with the upper face of the run rails 3, thus forming a continuous butting face for the rolls 4. The length P of the second

rail sections is equal to that of the first rail sections, whereby the second rail sections also barely fit into the opening 9 of the solid run rails 3.

According to a preferred embodiment of the invention, the second rail sections 23 are at least mainly plate-like bodies, whose motion in the vertical plane V is controlled e.g. by two fixed guides 16 and 17, placed near the outer surfaces of the rail section 23 in the direction of the plate or against these surfaces so that the plate-like second rail section 23 glides between these bodies 16 and 17 while preserving its correct direction. These guides 16 and 17 are solidly fixed to the wagon frame 2. The lower edge 14 and 15 of the second rail section 23 extends to the vicinity of the circumference of the pivot axle 7. A lever protrusion, a cam, a crank or similar has been designed as a lifting and lowering mechanism stationary on the circumference of the pivoted axle 7. In the embodiment of the figures, there are two lever protrusions 11, 12, which both extend from the circumference of the pivot axle 7 beneath the lower edge of the second rail section.

In this case, the operation of the lifting and lowering mechanism 18 is the following. When the pivoted axle 7 is turned counter-clockwise, i.e. in the direction 22 of figure 3, in the case of figure 1, in which the second rail section 23 is in its lower position A, the first lever protrusion 11 bears on the first lower edge 14 of the rail section, as shown in figure 1, and when the rotating motion 22 is carried on, the first lever protrusion lifts the rail section upwards. After a given rotation, the second lever protrusion 12 bears on the second lower edge 15 of the rail section and, when the rotating motions 22 go on, starts lifting the rail section 23 further upwards, until the second rail section 23 is in its upper position Y, as shown in figure 3. In this case, the pivoted axle 7 and its lever protrusions 11, 12 act as a kind of gear and the second rail section 23 with its step-wise lower edges 14, 15 acts as a matching cogged rail in order to lift and lower the second rail sections at the same time as the first rails sections 13 attached on the arm 10 of the pivoted axle 7 move the cover section 1 into its closed or its switch position. It is obvious that an inverse operation, rotating the pivoted axle 7 clockwise, brings the second rail sections from their upper position Y to their lower position A and the first rail sections repsectively lift the cover section from its closed position to its switch position. It is also obvious that the rotating direction described is reversed on the opposite side of the wagon and also depends on the viewing direction. There may obviously be either only one or more, as three or four lever protrusions, unlike the present embodiment. The second rail section 23 has respectively fewer or more lower edges, which can be step-wise in the direction of the axis of rotation 8 of the pivoted axle and thus in the direction C of the run rails 3 or stepwise in a direction B perpendicular to this, in addition to the stepwise arrangement shown in figures 2 and 4. In case openings are provided in the second rail section, these lower edges are naturally upper faces of the openings.

Among the guides controlling the up and down movements of the second rail section 23, the outer guide 17 is now easily designed as a construction protecting the whole mechanism and the rail sections 13 and 23. If the upper edge 21 of the outer guide 17 is extended to the area of the run rails 3 or to its vicinity and even to the level of the upper face of the run rail 3, or slightly above this, the first rail sections 13 in the opened area of the wagon and the joints between these and the run rails 3 are absolutely safely protected against chocks during the loading. The second rail section 23 is also very well protected behind the outer guide 17. Although the upper edge 21 of the outer guide 17 would be extended only to the height of the flanges of the rolls 4, as presented in figures 1 and 3, it still provides a most efficient protection for the first rail section 13 by preventing a force in essentially the transverse direction of the wagon from hitting this. Also in this case, the second rail sections 23 are well protected behind the outer guide 17 as shown in figures 1 and 3.

As shown in the preferred embodiment described above, the lever protrusions 11, 12 are situated essentially on the opposite side of the pivoted axle 7 with regard to the support member 10 connecting the first rail section 13 with the pivoted axle. An exact positioning naturally depends on the design of the construction elements and their relative mutual positions.

If the pivoted axle 7 is fairly exactly in the plane V determined by the second rail section 23, a simple cam formed around the pivot axle can also be used, whereby a so-called camshaft is formed to lift and lower the second rail section as the pivot axle is being turned. It is also possible to form a crank in the pivoted axle 7 and to connect it with the second rail section 23 by an arm articulated in both of these, thus producing a construction analogue with the crank machinery known from motors. However, the latter solution is too expensive for such a purpose of use, although it has the advantage of a mechanically controlled sinking of the rail section 23 into its lower position A. Similar mechanisms of other kinds are also conceivable. Regardless of the mechanism is a lever protrusion or a crank, its operation prerequisits that its operative length L, which is the distance to the articulation point of the crank or the contact point of the lever protrusion, in other words the lower edge of the second rail section 14, 15 from the axis of revolution 8 of the pivot axle, is equal to the distance S mentioned above or slightly greater than this. In the case of a cam, the operative deviation of the cam from the minimum thickness of the pivot axle 7 must be at least essentially equal to the lifting required for the second rail section 23.

By disposing, in the case of a cam or a crank, the upper position Y of the second rail section 23 to correspond at least essentially to the upper dead point, and especially in the case of a cam, by giving the peak of the cam an appropriate design, the construction is made very insensitive to operation errors. With regard to a cam, this is easy to understand when its peal is given a relatively flat and broad shape, whereby the second rail sec-

tion 23 and its upper edge 19 are at least practically retained at the run rails 3 although the pivot axle 7 would be slightly turned in a deflection angle corresponding to the peak area of the cam. In this situation, the rail section 23 is in its right position although the pivot axle 7 would not be turned sufficiently clockwise when closing the cover section 1 in order to obtain a play 24 between the first rail section 13 and the roll 4 shown in figure 3. In fact, the cover section is closed even without this play 24, as the pivot axle has not been turned in the direction 22 of its extreme position by mistake, but also in this case the upper edge 19 of the second rail section must be correctly positioned, and this is achieved by the invention. In the case of a lever protrusion, the corresponding operation is provided by giving the outer portion of the surface of the lever protrusion, or if there are more of them, of the last lever protrusion 12 in the rotation direction 22 from the pivot axle which lifts the rail section into its upper position, which bears on the lower edge of the rail section, in this case the second lower edge 15, such a curved shape that the contact point between this and the lower edge of the second rail section remains at least essentially stationary during the final part of the rotative motion of the pivot axle in the direction 22. Thus, the surface of the lever protrusion 12 bearing on the edge 15 is an evolving surface, the design of which obviously depends on the mutual positioning of the components and on the other dimensions. Such a surface shape can however always be defined.

In the preferred embodiment described above the second rail sections 23 move from their upper position Y into their lower position A under the effect of gravity. The downwards motion may be enhanced by an appropriate auxiliary spring, which presses the second rail section in its lower position A when released and the lifting from the lower position into the upper position Y being effected against this auxiliary spring. However, the motion of the second rail sections towards the lower position may also be mechanically controlled by adding lever protrusions 25 and 26 protruding solidly from the pivoted axle 7, a cam or similar to the lifting and lowering mechanism 18. In this case, the second rail section is provided with openings, protrusions 27, 28 or steps at the pivoted axle 7, the lever protrusions or similar bearing on the surface of these in order to lower the second rail sections from the upper position into the lower position. This surface is an upper surface in the case of protrusions and steps and the lower side of the opening in the case of openings, i.e. the respective opposite surface compared to the surface used for the lifting. Such a construction detail is presented in figures 5 and 6, in which there are two lever protrusions and protrusions of the second rail section. The lowering mechanism operates as follows. In figures 5 and 6, the second rail sections are in their upper position Y, in which the third lever protrusions 25 bear on the upper face of the first protrusions 27 of the rail sections as is clearly shown in figure 6. As the pivoted axle turns clockwise,, i.e. in the direction 29, the lever protrusions pull the second rail section 23 downwards with the intermediation of the protrusions of the rail section. After a given swing angle, fourth lever protrusions 26 bear on the upper face of the second protrusions 28 of the rail section and carry on the move of the second rail section 23 downwards as the rotative motion 29 goes on until the second rail section 23 is in its lower position A. These lever protrusions 25, 26 prevent an involontary upwards movement of the second rail section. It should be particularly noted that the third lever protrusions performing the lowering of the rail section and the first lever protrusions 11 performing its lifting are opposite edges of the same protrusions, i.e. the lower edges and the upper edges respectively. Other lifting and lowering lever protrusions can be combined accordingly. Exactly as above, a camshaft can be implemented for the lowering by using e.g. a double-cam shaft and a second fork-like rail section extending around these on the upper and the lower side. The protrusions, steps or openings of the second rail section may, as the corresponding lifting members, extend either in the direction of the axis of rotation 8 or perpendicularly to this. In addition, the adjusting member 30, very schematically represented in the embodiment of figure 5, such as an adjusting screw, is intended to set the relative position of the elements of the mechanism on the pivoted axle and the upper edge 19 of the second rail sections particularly during the assembling of the wagon, but also during the use.

The invention is not limited to the embodiments described here, but other shapes, dimensions and various combinations of the basic design are easily conceivable.

Claims

1. A covered railways wagon, in which at least one cover section is formed of walls (1) movable with respect to each other, which for partial opening of the wagon can be lifted and removed from each other by their lower edges into a switch position; the wagon comprising first rail sections (13), which bearing on the lower surface of support rolls (4) mounted onto bearings in the cover section, lift the support rolls from a position corresponding to the closed position of the walls onto fixed run rails (3) in the wagon frame, whereby second rail sections (23) from openings (9) of the stationary run rails (3) are removed to the side and the first rail sections (13) are aligned with these stationary run rails in their openings (9) thus forming a continuous running surface for the support rolls, along which the support rolls can roll, thus enabling to move the cover section in the longitudinal direction of the wagon with regard to the rest of the cover section; and second rail sections (23), which, as the support rolls move into a position corresponding to the closed position away from the stationary rails (3), are aligned with the stationary run rails (3) in their openings (9) and thus form a continuous running surface for the support rolls, the switch of the walls from the switch position

to the closed position involving essentially inverse actions; as the first rail sections (13) are fixed to the pivoted axle (7) which is disposed in such a position with regard to the run rails (3) that the predetermined rotation of the pivoted axle makes the first rail sections (13) move to the stationary run rails and back; as the axis of rotation (8) of the pivoted axle (7) is beneath the solid run rail (3) in the vertical plane determined by the run rail or maximally at a distance (S) from this towards the axis of the wagon, the said distance (S) being essentially smaller than the fixing distance (R) of the first rail section (13) from the axis of rotation (8); and the switch of the cover sections from their closed position to their moving position and back being carried out by a corresponding position switch of the rail sections (13) by means of the switch mechanism (6), **characterized** in that the second rail sections (23) are disposed to move up and down in the vertical plane (V) aligned with the solid run rails (3), whereby the upper position (Y) corresponds to the closed position of the walls and the lower position (A) corresponds to the switch position and in that the mechanism (18) lifting and lowering the second rail sections is connected to cooperate with the said switch mechanism (6) of the cover section.

2. A wagon according to claim 1, **characterized** in that the mechanism (18) lifting and lowering the second rails sections is a lever protrusion, a cam, a crank or similar (11, 12) stationary in the pivoted axle (7), that the second rail sections (23) are at least essentially vertical plate-like bodies, whose upper edge (19) is shaped as a rail, the lifting and lowering mechanism (18) bearing on their lower edge (14, 15) or a similar surface for the lifting from the lower position (A) into the upper position (Y) and for the lowering.

3. A wagon according to claim 2, **characterized** in that the operative length (L) of the lever protrusion, the crank or similar (11, 12) from the axis of rotation (8) of the pivoted axle (7) to the lower edge (14, 15) of the second rail section (23) is equal to the said distance (S) or somewhat greater than this and that the lever protrusion, the crank or similar points in another direction than the pivoted axle and advantageously in an essentially opposite direction than the support member (10) connecting the first rail sections (13) with the pivoted axle (7).

4. A wagon according to claim 2, **characterized** in that the operative deviation of the cam from the minimum thickness of the pivoted axle is equal to the lifting required for the second rail section (23).

5. A wagon according to claim 1, **characterized** in that the plate-like second rail sections (23) are controlled to move in an up and down direction by two vertical guide members (16, 17) disposed immediately on either side of it and in that the guide member placed on the outer side (17) of the wagon extends upwards in the area of the run rails (3) or its vicinity to form an edge (21) protecting these and the second rail sections (23) during the loading.

6. A wagon according to claim 2 or 3, **characterized** in that there are two or more successive lever protrusions or similar in the circumferential direction of the pivoted axle (7) and that there are respectively two or more openings or steps (14 and 15) at the lower edge of the plate-like second rail section (23), on which each successive lever protrusion, cam or crank bears successively in order to yield a lifting and lowering mechanism (18) of a gear-pinion rack type.

7. A wagon according to claim 2, 3, 4 or 6, **characterized** in that at least the outer portion of the surface of the lever protrusion, or of the last lever protrusion (12) in the rotation direction (22) from the pivoted axle which lifts the rail section into its upper position (Y), which bears on the lower edge (15) of the second rail section (23), or respectively the surface forming the upper dead point of the cam, has such a curved shape that the contact point between this and the lower edge of the second rail section remains at least essentially stationary during the end of the rotation of the pivoted axle (7) in the said direction (22) in order to retain the upper edge (19) of the second rail section while the pivoted axle performs this deflection angle.

8. A wagon according to claim 1 or 2, **characterized** in that the mechanism (18) which lifts and lowers the second rail sections (23) comprises a lever protrusion (25, 26), a cam or similar which is stationary in the pivoted axle (7), and the second rail sections comprise openings, protrusions (27, 28) or steps, the said lever protrusion, cam or similar bearing on the surface of these in order to lower the second rail sections from their upper position (Y) into their lower position (A).

Patentansprüche

1. Abgedeckter Eisenbahnwaggon, bei welchem wenigstens ein Abdeckungsabschnitt aus relativ zueinander bewegbarbaren Wänden (1) gebildet ist, welche zum teilweisen Öffnen des Waggons mittels ihrer unteren Ränder in eine Verschiebestellung gehoben und voneinander getrennt werden können, wobei der Waggon umfaßt: erste Schienenabschnitte (13), welche Stützrollen (4) von einer der geschlossenen Stellung der Wände entsprechenden Stellung auf feststehende Laufschienen (3) an dem Waggonrahmen heben und dabei die untere Fläche der an Lagern in dem Abdeckungsabschnitt angebrachten Stützrollen (4) stützen, wobei zweite

Schienenabschnitte (23) aus Öffnungen (9) der stationären Laufschienen (3) zur Seite hin entfernt werden und die ersten Schienenabschnitte (13) nach diesen stationären Laufschienen in deren Öffnungen (9) ausgerichtet werden, womit eine durchgehende Lauffläche für die Stützrollen gebildet wird, entlang der die Stützrollen rollen können, womit es ermöglicht wird, den Abdeckungsabschnitt in die Längsrichtung des Waggons bezüglich des Rests des Abdeckungsabschnitts zu bewegen, und zweite Schienenabschnitte (23), welche, bei Bewegung der Stützrollen weg von den stationären Schienen (3) in eine der geschlossenen Stellung entsprechende Stellung, nach den stationären Laufschienen (3) in deren Öffnungen (9) ausgerichtet werden und somit eine durchgehende Lauffläche für die Stützrollen bilden, wobei das Umschalten der Wände aus der Verschiebestellung in die geschlossene Stellung im wesentlichen inverse Vorgänge umfaßt, wobei die ersten Schienenabschnitte (13) an dem schwenkbar gelagerten Achselement (7) befestigt sind, welches bezüglich der Laufschienen (3) in einer derartigen Stellung angeordnet ist, daß die vorbestimmte Drehung des schwenkbar gelagerten Achselements eine Bewegung der ersten Schienenabschnitte (13) zu den stationären Laufschienen hin und zurück veranlaßt, wobei die Drehachse (8) des schwenkbar gelagerten Achselements (7) unterhalb der festen Laufschiene (3) in der durch die Laufschiene bestimmten Vertikalebene oder von dieser zur Waggonachse hin höchstens mit einem Abstand (S) angeordnet ist, wobei der Abstand (S) wesentlich kleiner ist als der festlegende Abstand (R) des ersten Schienenabschnitts (13) von der Drehachse (8), und wobei das Umschalten der Abdeckungsabschnitte von ihrer geschlossenen Stellung in ihre Bewegungsstellung und zurück durch ein entsprechendes Umschalten der Stellung der Schienenabschnitte (13) mittels des Umschaltmechanismus (6) ausgeführt wird, dadurch gekennzeichnet, daß die zweiten Schienenabschnitte (23) zur Aufund Abwärtsbewegung in der nach den festen Laufschienen (3) ausgerichteten Vertikalebene (V) angeordnet sind, wobei die obere Stellung (Y) der geschlossenen Stellung der Wände entspricht und die untere Stellung (A) der Verschiebestellung entspricht, und daß der die zweiten Schienenabschnitte hebende und senkende Mechanismus (18) zum Zusammenwirken mit dem Umschaltmechanismus (6) des Abdeckungsabschnitts verbunden ist.

2. Waggon nach Anspruch 1, dadurch gekennzeichnet, daß der die zweiten Schienenabschnitte hebende und senkende Mechanismus (18) ein Hebelvorsprung, ein Nocken, eine Kurbel oder dergleichen (11, 12) ist, welcher bzw. welche an dem schwenkbar gelagerten Achselement (7) stationär ist, daß die zweiten Schienenabschnitte (23) wenigstens im wesentlichen vertikale plattenartige Körper sind, deren oberer Rand (19) als eine Schiene gestaltet ist, wobei der Hebe- und Senkmechanismus (18) deren unteren Rand (14, 15) oder eine ähnliche Fläche zum Heben von der unteren Stellung (A) in die obere Stellung (Y) und zum Senken stützt.

3. Waggon nach Anspruch 2, dadurch gekennzeichnet, daß die wirksame Länge (L) des Hebelvorsprungs, der Kurbel oder dergleichen (11, 12) von der Drehachse (8) des schwenkbar gelagerten Achselements (7) zu dem unteren Rand (14, 15) des zweiten Schienenabschnitts (23) gleich dem Abstand (S) oder etwas größer als dieser ist und daß der Hebelvorsprung, die Kurbel oder dergleichen in eine andere Richtung zeigt, als das schwenkbar gelagerte Achselement und vorteilhafterweise in eine im wesentlichen entgegengesetzte Richtung als das die ersten Schienenabschnitte (13) mit dem schwenkbar gelagerten Achselement (7) verbindende Stützelement (10).

4. Waggon nach Anspruch 2, dadurch gekennzeichnet, daß die wirksame Abweichung des Nockens von der minimalen Dicke des schwenkbar gelagerten Achselements gleich dem für den zweiten Schienenabschnitt (23) benötigten Hub ist.

5. Waggon nach Anspruch 1, dadurch gekennzeichnet, daß die plattenartigen zweiten Schienenabschnitte (23) durch zwei unmittelbar an ihren beiden Seiten angeordnete vertikale Führungselemente (16, 17) zur Bewegung in eine Auf- und Abwärtsrichtung gesteuert sind und daß das an der Außenseite (17) des Waggons angeordnete Führungselement sich aufwärts in den Bereich der Laufschienen (3) bder deren Nähe erstreckt, um einen diese und die zweiten Schienenabschnitte (23) während des Beladens schützenden Rand (21) zu bilden.

6. Waggon nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß in der Umfangsrichtung des schwenkbar gelagerten Achselements (7) zwei bder mehrere aufeinanderfolgende Hebelvorsprünge oder dergleichen vorgesehen sind und daß an dem unteren Rand des plattenartigen zweiten Schienenabschnitts (23) entsprechend zwei oder mehrere Öffnungen oder Stufen (14 und 15) vorgesehen sind, an welchen sich jeder nachfolgende Hebelvorsprung, Nocken bder Kurbel nacheinander abstützt, um einen Hebe- und Senkmechanismus (18) von einem Zahnstangen-Ritzel-Typ zu bilden.

7. Waggon nach Anspruch 2, 3, 4 oder 6, dadurch gekennzeichnet, daß wenigstens der äußere Bereich der Fläche des Hebelvorsprungs bder des letzten Hebelvorsprungs (12) in der Drehrichtung (22) des den Schienenabschnitt in seine obere Stellung (Y) hebenden schwenkbar gelagerten Achsele-

ments, welche den unteren Rand (15) des zweiten Schienenabschnitts (23) stützt, oder entsprechend die den oberen Totpunkt des Nockens bildende Fläche eine derart gekrümmte Gestalt aufweisen, daß der Berührpunkt zwischen ihr und dem unteren Rand des zweiten Schienenabschnitts während des Endes der Drehung des schwenkbar gelagerten Achselements (7) in die Richtung (22) wenigstens im wesentlichen stationär bleibt, um den oberen Rand (19) des zweiten Schienenabschnitts zurückzuhalten, während das schwenkbar gelagerte Achselement diesen Auslenkwinkel ausführt.

8. Waggon nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Mechanismus (18), welcher die zweiten Schienenabschnitte (23) hebt oder senkt, einen Hebelvorsprung (25, 26), einen Nocken oder dergleichen aufweist, welcher an dem drehbar gelagerten Achselement (7) stationär ist, und die zweiten Schienenabschnitte Öffnungen, Vorsprünge (27, 28) oder Stufen aufweisen, wobei der Hebelvorsprung, Nocken oder dergleichen deren Fläche stützt, um die zweiten Schienenabschnitte von ihrer oberen Stellung (Y) in ihre untere Stellung (A) zu senken.

Revendications

1. Wagon ferroviaire couvert, dans lequel au moins une section de couverture est formée de parois (1) mobiles les unes par rapport aux autres, qui peuvent être relevées et écartées les unes des autres par leurs bords inférieurs dans une position de translation en vue d'une ouverture partielle du wagon; le wagon comprenant des premières sections de rail (13), qui, portant sur la surface inférieure de galets porteurs (4) montés sur des paliers dans la section de couverture, élèvent les galets porteurs depuis une position correspondant à la position fermée des parois, sur des rails de roulement fixes (3) dans le châssis de wagon, ce qui écarte des deuxièmes sections de rail (23) d'ouvertures (9) des rails de roulement fixes (3) latéralement et aligne les premières sections de rail (13) avec ces rails de roulement fixes dans leurs ouvertures (9), formant ainsi une surface de roulement continue pour les galets porteurs, le long de laquelle les galets porteurs peuvent rouler, ce qui permet de déplacer la section de couverture dans le sens longitudinal du wagon par rapport au reste de la couverture; et des deuxièmes sections de rail (23), qui, lorsque les galets porteurs s'écartent des rails fixes (3) vers une position correspondant à la position fermée, sont alignées avec les rails de roulement fixes (3) dans leurs ouvertures (9) et forment ainsi une surface de roulement continue pour les galets porteurs, le passage des parois de la position de translation vers la position fermée impliquant essentiellement des actions inverses; comme les premières sections de rail (13) sont fixées à l'axe-pivot (7) qui est disposé, par rapport aux rails de roulement (3), dans une position telle que la rotation prédéterminée de l'axe-pivot provoque le déplacement des premières sections de rail (13) vers les rails de roulement fixes et depuis ceux-ci; comme l'axe de rotation (8) de l'axe-pivot (7) se trouve en dessous du rail de roulement massif (3) dans le plan vertical déterminé par le rail de roulement ou au maximum, à une distance (S) de celui-ci vers l'axe du wagon, ladite distance (S) étant essentiellement inférieure à la distance de fixation (R) de la première section de rail (13) depuis l'axe de rotation (8); et le passage des sections de couverture de leur position fermée à leur position de translation et inversement étant effectué par un changement de position correspondant des sections de rail (13) à l'intervention du mécanisme de manoeuvre (6), caractérisé en ce que les deuxièmes sections de rail (23) sont disposées de manière à monter et descendre dans le plan vertical (V) aligné avec les rails de roulement massifs (3), sachant que la position haute (Y) correspond à la position fermée des parois et la position basse (A) correspond à la position de translation et en ce que le mécanisme (18) qui élève et abaisse les deuxièmes sections de rail est accouplé de manière à coopérer avec ledit mécanisme de manoeuvre (6) de la section de couverture.

2. Wagon suivant la revendication 1, caractérisé en ce que le mécanisme (18) qui élève et abaisse les deuxièmes sections de rail est une saillie de levier, une came, une manivelle ou un organe analogue (11, 12) calé sur l'axe-pivot (7), en ce que les deuxièmes sections de rail (23) sont des corps en forme de plaque au moins essentiellement verticaux, dont le bord supérieur (19) a la forme d'un rail, le mécanisme d'élévation et d'abaissement (18) appuyant sur leur bord inférieur (14, 15) ou sur une surface semblable pour l'élévation depuis la position inférieure (A) dans la position haute (Y) et pour l'abaissement.

3. Wagon suivant la revendication 2, caractérisé en ce que la longueur active (L) de la saillie de levier, de la manivelle ou d'un organe analogue (11, 12), qui est la distance de l'axe de rotation (8) de l'axe-pivot (7) jusqu'au bord inférieur (14, 15) de la deuxième section de rail (23), est égale ou quelque peu supérieure à ladite distance (S) et en ce que la saillie de levier, la manivelle ou l'organe analogue s'étend dans une autre direction que l'axe-pivot et de manière avantageuse dans une direction essentiellement opposée à l'organe de support (10) qui relie les premières sections de rail (13) à l'axe-pivot (7).

4. Wagon suivant la revendication 2, caractérisé en ce que la déviation opératoire de la came par rapport

à l'épaisseur minimum de l'axe-pivot est égale à la levée requise pour la deuxième section de rail (23).

5. Wagon suivant la revendication 1, caractérisé en ce que le mouvement de montée et de descente des deuxièmes sections de rail en forme de plaque (23) est contrôlé par deux organes de guidage verticaux (16, 17), disposés directement de part et d'autre de la section de rail et en ce que l'organe de guidage (17) placé sur le côté extérieur du wagon s'étend vers le haut dans la région des rails de roulement (3) ou dans leur voisinage afin de former un bord (21) qui les protège et protège les deuxièmes sections de rail (23) pendant le chargement.

6. Wagon suivant la revendication 2 ou 3, caractérisé en ce qu'il y a deux ou plus de deux saillies de levier ou organes analogues successifs sur la circonférence de l'axe-pivot (7) et en ce qu'il y a respectivement deux ou plus de deux ouvertures ou gradins (14 et 15) dans le bord inférieur de la deuxième section de rail en forme de plaque (23), sur lesquels successivement chaque saillie de levier, came ou manivelle successive porte successivement de manière à donner un mécanisme de levage et d'abaissement (18) du type engrenage-crémaillère.

7. Wagon suivant la revendication 2, 3, 4 ou 6, caractérisé en ce qu'au moins la partie extérieure de la surface de la saillie de levier, ou de la dernière saillie de levier (12) dans le sens de rotation (22) de l'axe-pivot qui élève la section de rail dans sa position haute (Y), qui porte sur le bord inférieur (15) de la deuxième section de rail (23), ou respectivement, la surface formant le point mort haut de la came, a une forme courbe telle que le point de contact entre celle-ci et le bord inférieur de la deuxième section de rail reste au moins essentiellement fixe pendant la fin de la rotation de l'axe-pivot (7) dans ledit sens (22) afin de retenir le bord supérieur (19) de la deuxième section de rail, tandis que l'axe-pivot effectue cet angle de déviation.

8. Wagon suivant la revendication 1 ou 2, caractérisé en ce que le mécanisme (18) qui élève et abaisse les deuxièmes sections de rail (23) comprend une saillie de levier (25, 26), une came ou un organe analogue qui est fixe dans l'axe-pivot (7), et les deuxièmes sections de rail comprennent des ouvertures, des saillies (27, 28) ou des gradins, étant entendu que ladite saillie de levier, ladite came ou ledit organe analogue porte contre la surface de ceux-ci afin d'abaisser les deuxièmes sections de rail depuis leur position haute (Y) dans leur position basse (A).

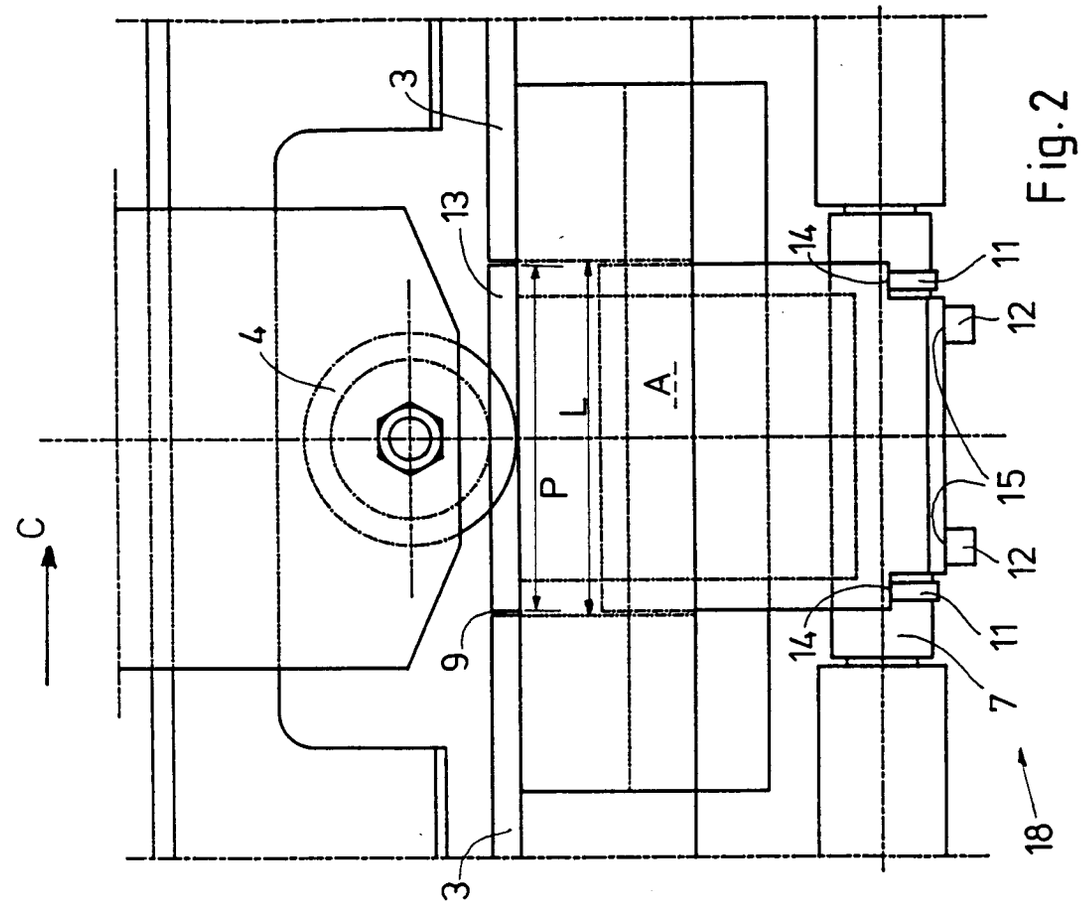

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Fig.2

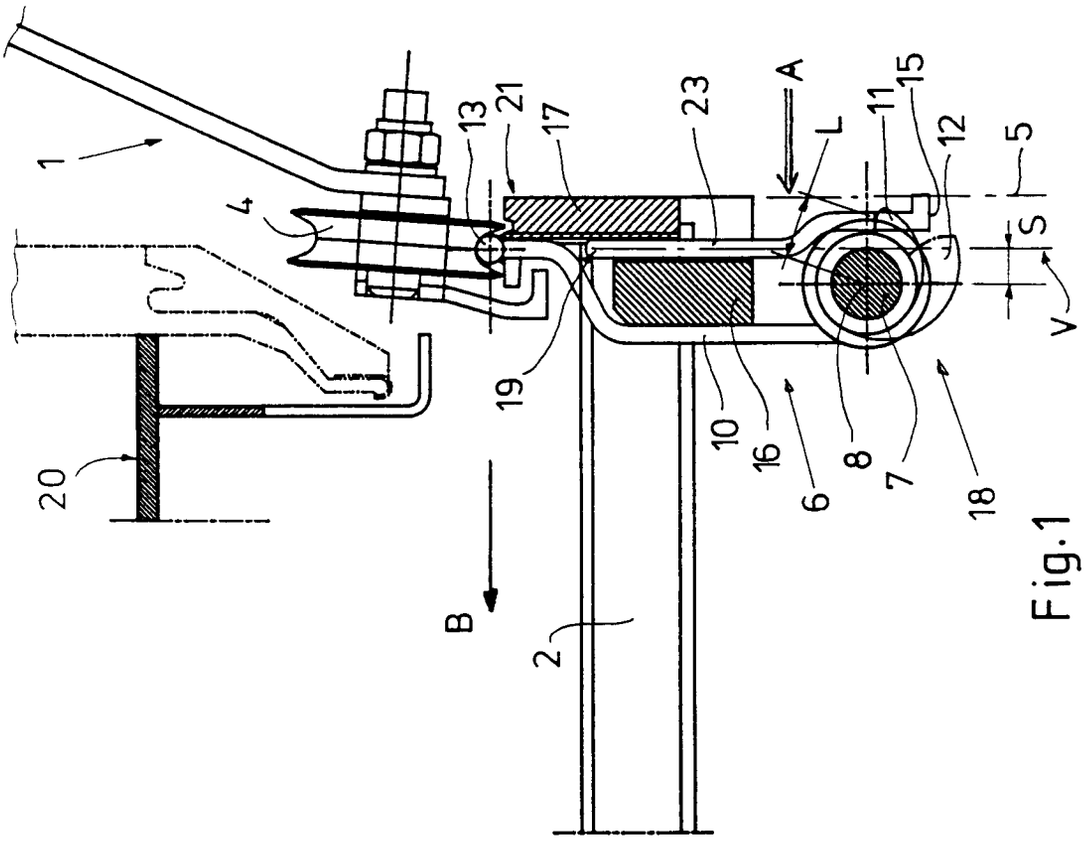

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Fig.1

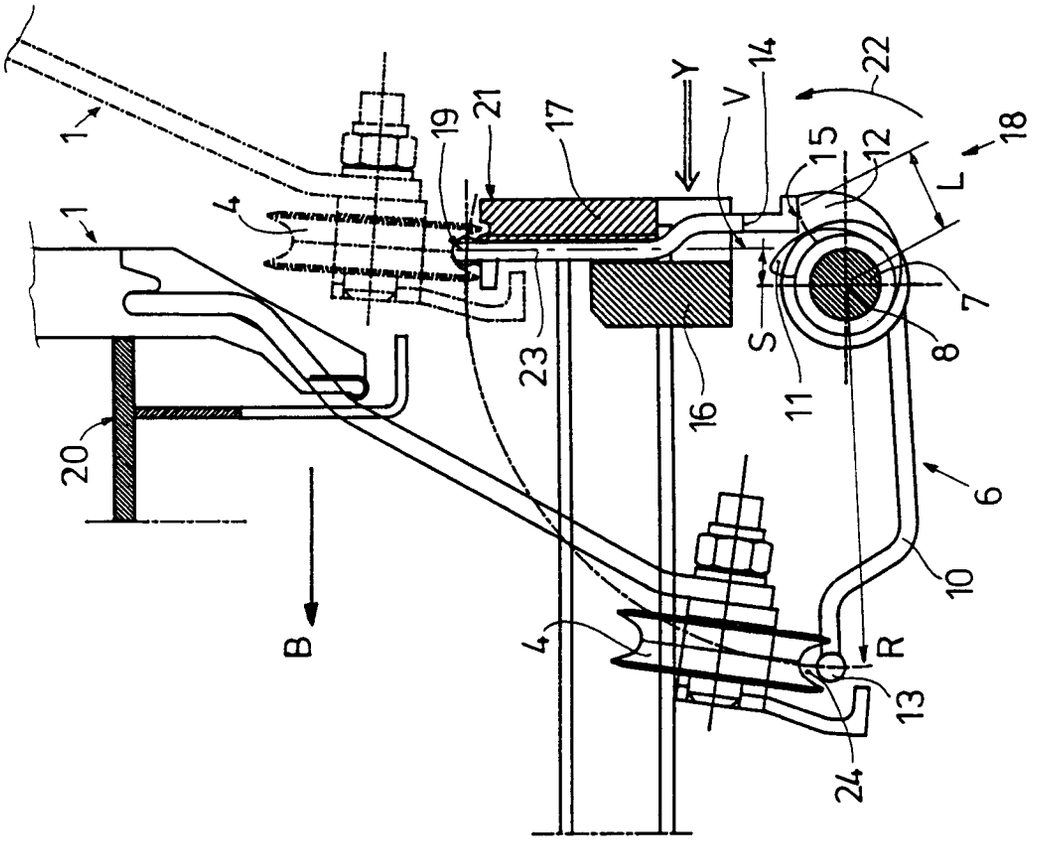

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Fig. 3

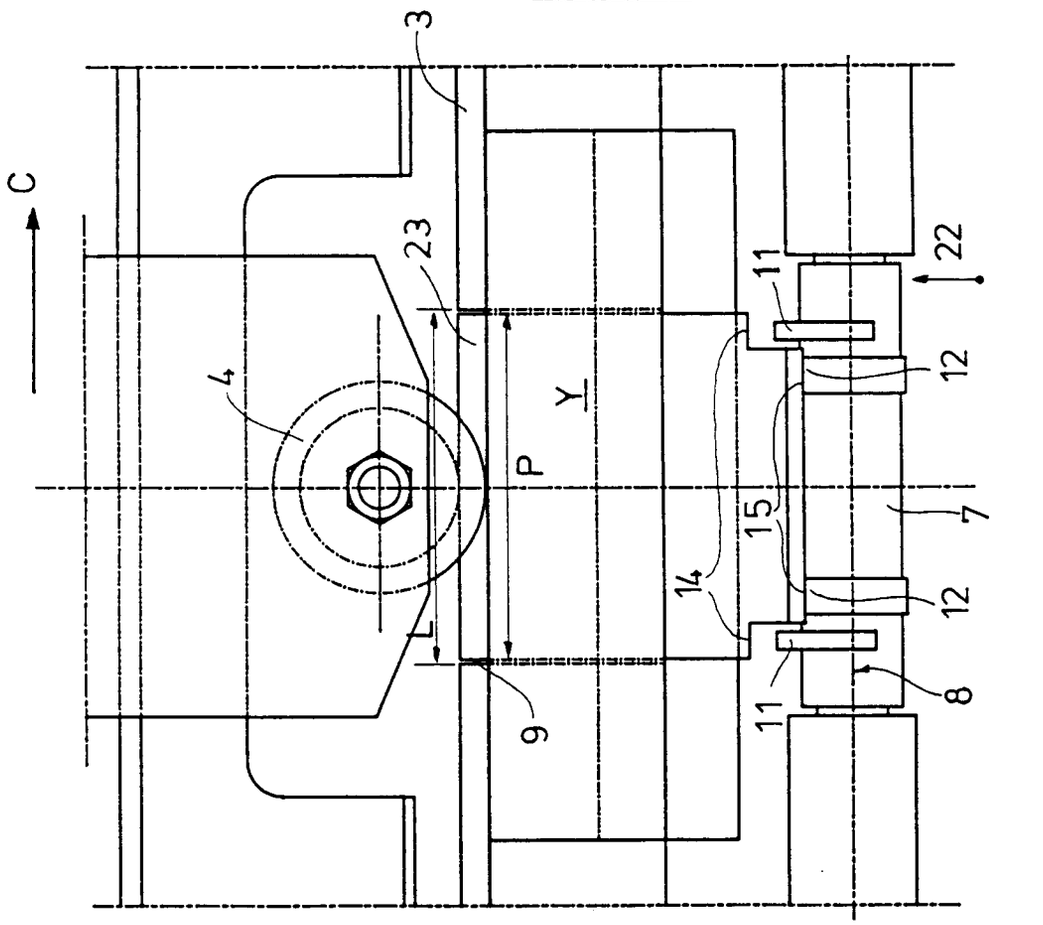

C
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Fig. 4

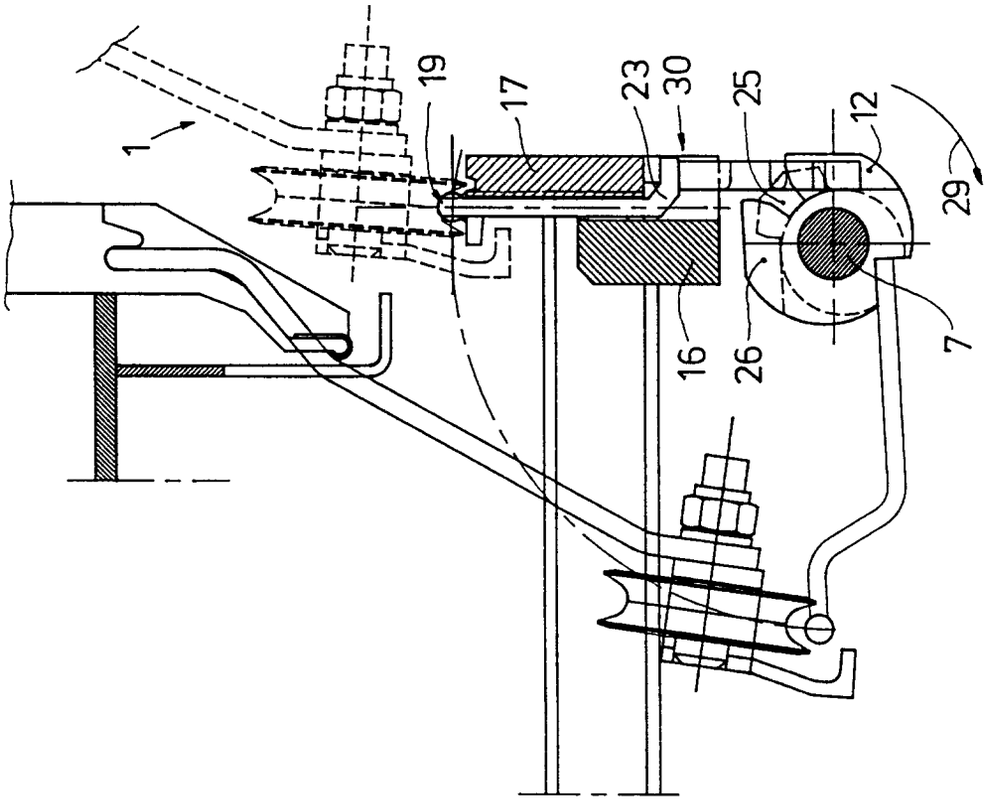


Fig.5

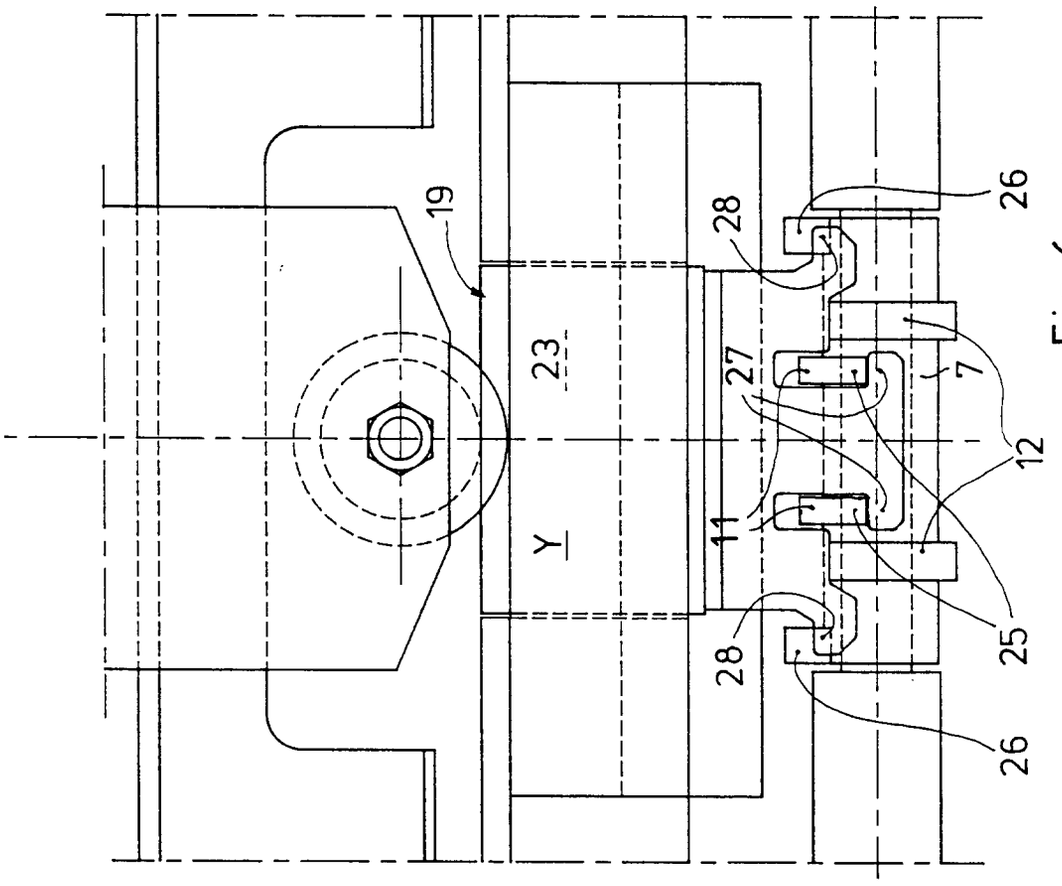


Fig.6

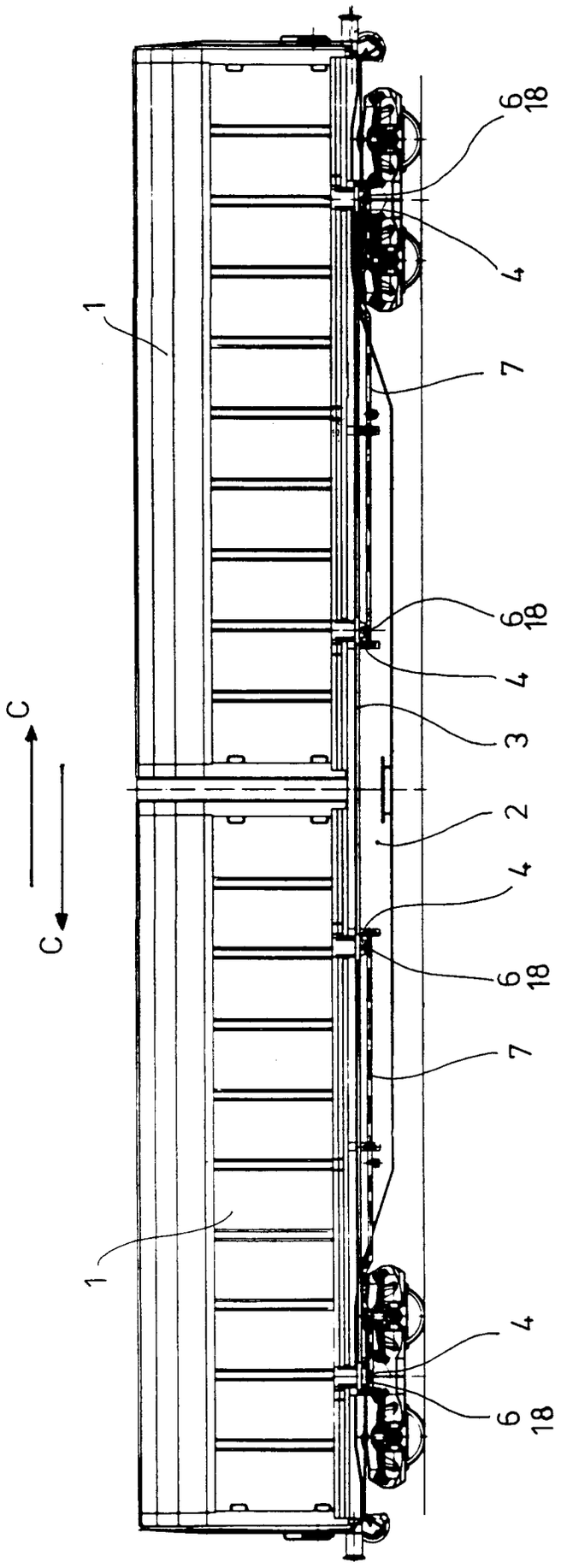


Fig.7